

Vojtěch Adam investigation report

Preamble

This document summarizes the findings of an investigation Committee established to evaluate the discrepancies in published work by Prof. Vojtěch Adam, Ph.D. as reported on PubPeer. The Committee focused exclusively on evaluating the data integrity and possible breaches of the principles of good scientific practice.

Timeline of events leading to the investigation

On October 18, 2021 Prof. Vojtěch Adam was elected the new Rector of Mendel University of Brno (MENDELU). The news was announced informally on Twitter by the outgoing Rector of MENDELU Danuše Nerudová. In the thread that followed, several Twitter users pointed out that a number of published papers co-authored by Prof. Adam were flagged on PubPeer for possible data manipulation. This discussion attracted further scrutiny of Prof. Adam's published work and shortly afterwards, questions arose about 26 of the papers he co-authored (a majority of discrepancies were posted on PubPeer by the leading scientific image forensics expert Elisabeth Bik). The case attracted significant media attention and on October 22, the three institutions with which Prof. Adam is affiliated (MENDELU, Brno University of Technology (BUT) and Central European Institute of Technology (CEITEC)) issued a press release announcing a plan to establish an investigation Committee to evaluate the reported discrepancies.

Investigation

The investigation Committee included representatives of the institutions where Prof. Adam is affiliated and experts in the relevant research fields from the broader Czech and international scientific community and consisted of six members:

- Mgr. Pavel Tomančák, Ph.D. – senior research group leader at the Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG) in Dresden and the Director of the CEITEC consortium
- Prof. Ing. Danuše Nerudová, Ph.D. – rector of MENDELU
- Prof. RNDr. Radim Chmelík, Ph.D. – research group leader at the CEITEC BUT
- Prof. Ing. Jaroslav Doležel, DrSc. – senior researcher at the Institute of Experimental Botany of the Czech Academy of Sciences in Olomouc
- Prof. RNDr. Jan Černý, Ph.D. – group leader at the Department of Cell Biology, Faculty of Life Sciences of the Charles University in Prague
- Dr. André Nadler – senior research group leader at the MPI-CBG in Dresden

The Committee met for the first time on November 15, 2021 and decided that the investigation will focus on the 12 publications flagged on PubPeer where Vojtěch Adam is the corresponding author (see **References**). This decision was made to ensure a swift conclusion of the investigation as in his capacity of corresponding author, Vojtěch Adam is directly responsible for archiving the raw data and delays caused by obtaining data from other institutions could thus be avoided. The Committee felt that these 12 papers constitute a sufficient subset to draw general conclusions. The 12 papers were divided equally among the four Committee members with matching scientific expertise (Chmelík, Doležel, Černý and Nadler) for in depth evaluation. Danuše Nerudová did not participate in further proceedings of the Committee. Pavel Tomančák was elected the speaker of the Committee.

The Committee requested from Prof. Adam **raw data** for all Figures in the 12 publications, including supplementary Figures, relevant **lab notebook pages** and **editorial correspondence**. Prof. Adam was given three weeks to collect and deliver the material.

On December 6, 2021 the requested materials were delivered to the Committee. In addition, Prof. Adam and his team submitted errata for 8 out of the 12 papers, three of which were already published by the respective journals (Kynicky et al., 2018; Merlos Rodrigo et al., 2019; Milosavljevic et al., 2016). The Committee has received the information that two papers will be retracted, however the status of the decision at the journals is currently unknown. On December 16, 2021, the Committee met with Prof. Adam online for two hours to discuss the materials. Written minutes of the meeting were sent to Prof. Adam on December 27, 2021.

Conclusions of the Committee regarding the seriousness of the irregularities found in the 12 papers

The Committee members studied the papers assigned to them as well as the raw material provided by Prof. Adam and his team. The Committee members and its speaker asked Prof. Adam specific questions about the raw materials and inquired about how the apparent mistakes could have occurred. Based on their own evaluation and the discussion with Prof. Adam, the Committee classified the publications into three groups with increasing severity of the data integrity issues and recommended specific actions to correct the scientific record.

1. No further action required (3 papers)

1. In Vanickova et al. (2019) the similarity of microscopy images in Figure 3 can be explained by the fact that these are consecutive sections of the same tissue. The similarities in outlier distributions in molecular masses in Figure 4 could be attributed to common contaminants present in mass spectrometric analysis. Explanation of these issues on PubPeer are deemed sufficient to correct the scientific record.
2. The duplication of pictures of a vials in Figure 3 of Jimenez Jimenez et al. (2019) could have occurred by accident and simple erratum is deemed sufficient to correct the scientific record.
3. In Cihalova et al. (2017), Figure 2B, the absorbance traces show unexpected similarities in oscillating patterns. The raw data show that the actual absorbance measures are different. The Committee discussed that replication of the experiment would dispel any suspicion of the origin of the striking similarity among the singular measurements. Nevertheless, the explanation and data posted on PubPeer are deemed sufficient to correct the scientific record (note that meanwhile the explanation and data have been removed from PubPeer).

2. Consider retraction (3 papers)

1. In Milosavljevic et al. (2016), Figure 4 panels (a) and (d) are duplicated. The “raw” data provided by Prof. Adam to replace the panels (a) and (d) are in jpeg format and contain scale bars. Therefore, they are unlikely to represent the true raw data coming from a microscope. Interestingly, only the original image for panel (a), which has been removed from the corrected image, fulfils the criteria of a raw image in tiff format with metadata indicating the origin from Olympus microscopy software. In the absence of the raw data, the Committee cannot make a definitive evaluation and recommends to consider a retraction.

2. In Figure 4 of Milosavljevic et al. (2017) the microscopy panels in the second column are duplicated, however the intensities of the images are clearly different. What was provided as “raw” microscopy data are low resolution jpeg files, which are unlikely to come from a microscopy acquisition software. The timestamps of the images come from 2021 and there are no accompanying lab notebook records. It is therefore impossible to formulate a plausible scenario of how such an error could occur. If this were an isolated incident, one could potentially accept it as a mistake. However, given the multiplicity of these issues in Prof. Adam’s published papers, this paper is another candidate for retraction.
3. Two panels of Figure 3 in Jamróz et al. (2018) are identical. The raw data provided are of sufficient quality. The Committee agreed with Prof. Adam that there was no reason to duplicate the image. However, the Committee noted that the whole image is rather sloppily assembled, panels are not aligned and there are duplications in the top row of the same image. Since the quality of data presentation does not indicate a high degree of scientific rigour, Prof. Adam should consider a retraction.

3. Recommend retraction (6 papers)

1. In Figure 1 of Heger et al. (2016) the same microscopy field is used twice and rotated. Prof. Adam was unable to explain how and why such manipulation could occur. Moreover, Figure 4 in the same paper contains multiple instances of apparently duplicated bands in qPCR analysis. The raw gel data provided lack annotations and are not accompanied by entries in lab notebooks. With this level of presentation of the raw data, it is impossible to determine how and why the incorrect assembly of the composite image occurred and therefore the Committee recommends retracting the paper in order to correct the scientific record.
2. Multiple issues were detected in Merlos Rodrigo et al. (2018) published in *Oncotarget*. The gel in Figure 1E shows duplication and manipulation (mirroring) of bands serving as a loading controls. Prof. Adam provided an image of a replacement gel. However, he was unable to explain where the originally published gel images came from. Figure 3C shows image duplication and manipulation that can only be explained by a deliberate action. Moreover, in the process of reviewing the paper both a Committee member and Prof. Adam spotted another problem with Supplementary Figure 1. Here, the loading controls are beyond any doubt manipulated. It is particularly apparent when examining the “raw” datafile provided by Vojtěch Adam in the form of a PowerPoint presentation. Pairs of loading controls bands appear as individual objects sometimes mirrored after duplication (**Figure 1A** in this Report). The objects are in fact cropped from larger images that are still present in the PowerPoint file. These images have additional bands on them and there is absolutely no doubt that they were duplicated, mirrored and scaled before the crop was applied. Additionally, a Committee member found out that the same set of loading controls were used in another publication (Merlos Rodrigo et al., 2018 published in *Prostate* and also flagged on PubPeer, **Figure 1B**). Finally, Prof. Adam did provide a new supplementary figure and accompanying raw data. However, this set of data suffers from the same shortcomings as the original dataset. Namely, the bands are assembled together in PowerPoint and placed at a molecular weight that is far higher than in the raw data (which lacks any lane annotations, **Figure 1C, D**). Prof. Adam was unable to explain where the loading control for this gel came from. Notably, the new gel appears to

show exactly opposite result as compared to the published one. Given the plethora of integrity issues with this paper, the Committee recommends its immediate retraction along with the paper by Merlos Rodrigo et al. (2018) in *Prostate* from where the above-mentioned loading controls apparently originated.

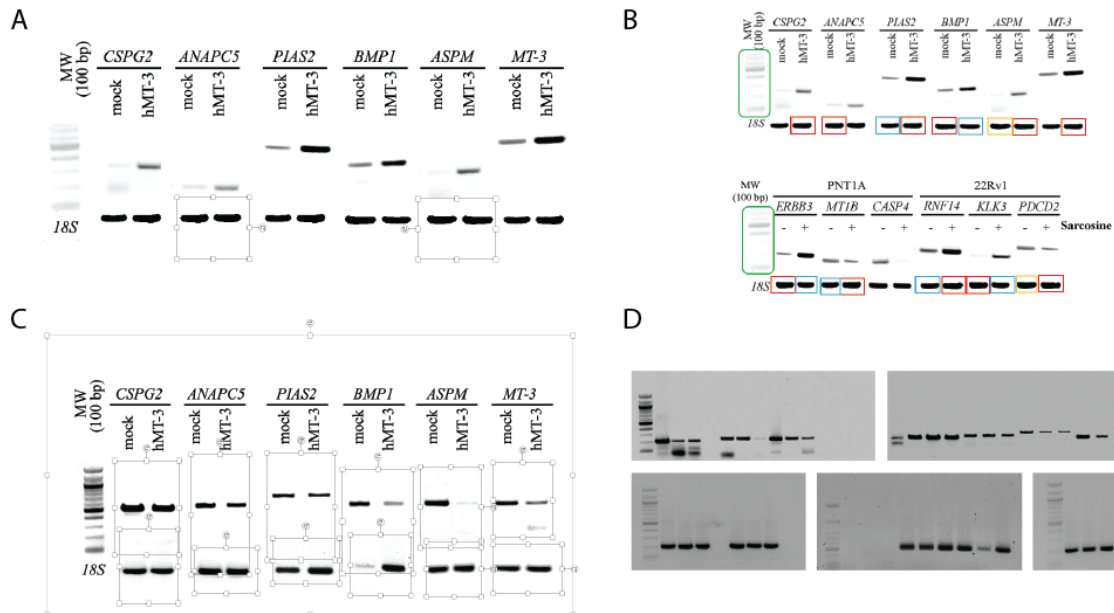


Figure 1 Examples of "raw" data presented in connection with Merlos Rodrigo et al. (2018) in *Oncotarget*. (A) Screenshot of a gel submitted as a PowerPoint file to represent the original published version of Supplementary Figure 1. Two pairs of 18S loading control bands were clicked on to show that they are PowerPoint objects. The position of the handle indicates that they were mirrored. (B) Top panel shows the same Supplementary Figure 1 from Merlos Rodrigo et al. (2018) in *Oncotarget*, bottom panel shows Figure 1B from Merlos Rodrigo et al. (2018) in *Prostate*. Colored boxes highlight duplicated and sometimes mirrored bands, which were used in two distinct papers in a different context. (C) Screenshot of a gel image submitted as a PowerPoint slide as a replacement for the Supplementary Figure 1. Note that every band pair is a separate object. (D) Gel images submitted as raw data for the gel composite shown in (C). Note that the molecular weight of all bands is lower as compared to the panel (C). No lanes are labelled and it is not clear whether the 18S loading controls are also coming from those gels.

3. In panel A of Figure 7 of Kynicky et al. (2018) an image manipulation was detected. For no obvious reason, the top part of the image was duplicated and mirrored at the bottom of the same image. Unfortunately, Prof. Adam did not provide raw data for this experiment, and the replacement panel A shows significantly different background compared to other images. This does not inspire confidence that the replacement image is coming from the same set of microscopy experiments and therefore the Committee recommends a retraction of the paper.
4. In Chudobova et al. (2014) the image forensics experts suggested that one of the bands in the qPCR analysis in Figure 5 may have been spliced from the loading control. It is hard to imagine why one would do that in this context. As a response to this allegation, Prof. Adam provided an image of a completely different gel. However, the loading control remained the same. It is very unclear why one would perform a single control amplification, but two distinct experimental amplifications (presumably on the same sample – lab records are missing) and then publish the one that was potentially

manipulated. If the results are different in separate qPCR runs, the experiments ought to be further replicated and averaged. The Committee feels that the data integrity in this experiment has been compromised and the paper should be retracted.

5. In Merlos Rodrigo et al. (2019) another instance of microscopy image duplication in Figure 5 was detected. This could have arisen by mistake and thus would be considered only a candidate for retraction. However, the inspection of the “raw” data revealed additional issues. Microscopy images were again presented only as low-resolution jpeg files (Figure 6), data for replicates were not provided (Figure 5B) and molecular weight markers in raw data for Figure 2D showed unexpected level of similarity. Taken together, the Committee concluded that the integrity of the data in this publication has been compromised and the paper should be retracted.
6. In Dostalova et al. (2016) Elisabeth Bik spotted remarkable similarities in the appearance of nanoparticles in electron microscopy (EM) images, and these impressions were confirmed by the Committee members. Since only subsets of EM images were duplicated, this does not appear to be a simple mistake but rather an intentional image manipulation. Moreover, the replacement Figure panel created to correct this manipulation, does not correspond to any of the raw microscopy images provided by Prof. Adam, raising the question where the new panel comes from. The Committee concludes that the failure to provide convincing replacement images for the problematic figure panel reinforces the need to retract the paper.

General observations by the Committee

Prof. Adam put a lot of effort into correcting the scientific record after the PubPeer allegations appeared. His general approach was to thank the image forensic experts for spotting the discrepancies, assembling new versions of the affected Figures and submitting them to the respective journals as errata. He emphasized that in a vast majority of the cases, the implemented changes had no impact on the scientific conclusions of the papers.

The Committee came to the consensus that this argument together with the errata is not sufficient to convincingly correct the scientific record. Scientific work relies crucially on extreme rigour and requires maximum integrity in the presented data. Whenever discrepancies are so obvious that they can be discovered simply by visual inspection, a doubt is cast on the entire piece of work. It is irrelevant whether the manipulations are intentional or result from negligence. The only meaningful defence in such a case is to identify the source of the discrepancy by inspecting the raw data and thus dispel any notion of misconduct.

Apparently, Prof. Adam did not grasp the Committee’s definition of raw data. The microscopy images he provided were in most cases low-resolution jpeg files that were used to assemble the composite figures. The Committee expected to receive the raw data files from microscopy software. Without exception, single images were presented as if no other data supporting the conclusions of the work exist. If mistakes were made, one would expect that wrong images were picked from a large pool of data - perhaps due to ambiguous naming of the files. Since almost none of the datasets were accompanied by laboratory notebook records, no such scenarios could be envisaged. This approach to raw data management is not in line with a good scientific practice.

For images of molecular biology gels, the Committee was expecting to receive raw scans of complete experiments with individual lanes labelled and, when appropriate, sufficiently replicated. Instead, Prof. Adam’s laboratory apparently assembled gels in PowerPoint as

collages of objects cropped from the raw data. This, however, is not an acceptable scientific practice. Moreover, occasionally the band objects were arbitrarily placed regardless of molecular weight, duplicated and mirrored (Merlos Rodrigo et al., 2018 in *Oncotarget*; Merlos Rodrigo et al., 2018 in *Prostate*). This is a clear case of scientific misconduct.

Preparing Figures for scientific publications is a meticulous effort that demands attention to every detail. For many of the figures that the Committee studied, this level of care was not apparent. Some of the duplications were glaringly obvious and should have been detected by the authors. This oversight might be attributed to the unprecedented volume of publications that the group of Prof. Adam produced over the years. Adaptive behaviour towards high volume publishing is detrimental to the quality of science.

It was particularly concerning that in at least two cases, discrepancies appeared also in the data provided to the Committee as corrections. Moreover, the explanation of the discrepancies presented to the Committee differed from the explanations given to the media (Figure 1E in Merlos Rodrigo et al., (2018) commented on in DenikN newspaper¹). The Committee leaves the interpretation of these observations to others.

Finally, the Committee was struck by the poor level of peer review and editorial handling of most of the papers in questions. Given the superficial nature of the editorial processes, the Committee recommends to disregard the errata that these publishers so easily accepted. Scientists should strive to publish their work in journals with higher standards.

Conclusion

Taken together, the Committee concludes that the published work carried out in the laboratory of Prof. Adam and evaluated by the Committee did not adhere to the principles of good scientific practice. The issues ranged from gross negligence in quality control to clear signs of data manipulation. The Committee recommends retracting at least 6 papers to correct the scientific record.

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¹ <https://denikn.cz/732555/nastupujici-rektor-musi-vysvetlovat-podezreni-z-falsovani-dat-nebyl-to-umysl-ale-technicka-chyba-tvrdi/?cst=ec3c8d1deaaa96a5b05994fcf34bcaa647af4887>

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